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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,366	12/09/2003	Kenneth Boyd	81092490FGT1889	1365

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EXAMINER	
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ART UNIT	PAPER NUMBER
2128	

DATE MAILED: 08/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/707,366	BOYD ET AL.	
	Examiner	Art Unit	
	Kimberly Thornewell	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/9/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claims 1-20 are pending in the instant application.

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 12/9/2003 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1 and 10 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 4, respectively, of copending Application No. 10/707,366. Although the conflicting claims are not identical, they are not

patentably distinct from each other because claims 1 and 10 of the instant application contains every element of and therefore anticipates claim 1 and 4 of the copending application.

Claim 1 of each application reads as follows:

Instant Application Claim 1	**Copending App. 10/707,368 Claim 1**
A simulation system for simulating an operation of an automotive vehicle comprising:	A simulation system for simulating an operation of an automotive vehicle comprising:
An input providing vehicle information and path information;	An input providing vehicle information and path information;
A controller having a vehicle computer model therein,	A controller having a vehicle computer model therein,
Said controller programmed to determine a **rear side slip angle of a vehicle computer model;**	Said controller programmed to determine a curvature of an intended path from the path information;
When the rear side slip angle is greater than a threshold, determine a look ahead scale factor;	Determine a look ahead scale factor as a function of the intended path;
When the rear side slip angle is greater than the threshold, increase a look ahead point as a function of the look ahead scale factor;	Determine a look ahead point as a function of the look ahead scale factor;
Determine a steering wheel angle input to the computer model by comparing the look ahead	Operate the computer model with the steering wheel angle input;

point and the intended path;	
Operate the computer model with the steering wheel angle input; and	Operate the computer model with the steering wheel angle input; and
Generate an output in response to the vehicle model and the initial steering wheel input or the first steering wheel input.	Generate an output in response to the vehicle model and the initial steering wheel input or the first steering wheel input.

Claim 10 of the instant application and claim 4 of the copending application read as follows:

Instant Application Claim 10	**Copending App. 10/707,368 Claim 4**
A method of operating a vehicle computer model having vehicle information and path information therein comprising:	A method of operating a vehicle computer model having vehicle information and path information therein comprising:
Determining a **rear side slip angle of a vehicle computer model;**	Determining a curvature of an intended path from the path information;
When the rear side slip angle is greater than a threshold, determining a look ahead scale factor;	Determining a look ahead scale factor as a function of the intended path;
When the rear side slip angle is greater than the threshold, increasing a look ahead point as a function of the look ahead scale factor;	Determining a look ahead point as a function of the look ahead scale factor;

Determining a steering wheel angle input to the computer model by comparing the look ahead point and the intended path;	Determining a steering wheel angle input to the computer model by comparing the look ahead point and the intended path;
Operating the computer model with the steering wheel angle input.	Operate the computer model with the steering wheel angle input;

As per claim 1, the claimed determining of a "rear side slip angle based of a vehicle computer model" of the instant application is not claimed in the copending application. The determining of a look ahead scale factor and increasing of a look ahead point "when the rear side slip angle is greater than a threshold" of the instant application is also not claimed in the copending application. However, these limitations merely further define the system in claim 1 of the copending application, and the system of claim 1 of the instant application does not result in a different invention from that of the copending application.

As per claim 10, the claimed determining of a "rear side slip angle based of a vehicle computer model" of the instant application is not claimed in the copending application. The determining of a look ahead scale factor and increasing of a look ahead point "when the rear side slip angle is greater than a threshold" of the instant application is also not claimed in the copending application. However, these limitations merely further define the method in claim 1 of the copending application, and performing the method of claim 1 of the instant application does not result in a different invention from that of the copending application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Objections

4. Claims 1, 8, and 17 are objected to because of the following informalities:

Claim 1, line 13 should read, "*determine* a steering wheel angle input..."

Claim 8, although directed to a system, appears to read like a method step. Furthermore, "that the threshold" in line 2 should read "than the threshold."

Claim 17 appears to be directed to an additional method step. Therefore, the word "wherein" in line 1 should be replaced with the phrase "further comprising." Furthermore, "that the threshold" in line 2 should read "than the threshold."

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "the initial steering wheel input or the first steering wheel input" in the last two lines of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claims 2-9 are rejected because of their dependence on claim 1.

Claim Rejections - 35 USC § 101

7. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 10-18 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 10 is directed to a method of operating a vehicle computer model. This claim is interpreted to be software, per se. The method results in determining a steering wheel angle input, and operating the computer model with the steering wheel angle input. However, the Applicant has not disclosed a tangible way in which the model is operated. Dependent claims 11-18 are rejected because they also do not set forth a tangible way in which to operate a computer model.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharp et al., "Optimal Preview Car Steering Control," published in Vehicle System Dynamics in 2001, in view of Taylor et al., "Vision-Based Lateral Control Strategies," published in The International Journal of Robotics Research in 1999.

As per claim 1, Sharp discloses a simulation system for simulating an operation of an automotive vehicle comprising:

- An input providing vehicle information **(page 2 section 2)** and path information **(page 4 section 3)**;
- A controller having a vehicle computer model therein **(page 1 last paragraph lines 8-11)**, said controller programmed to:
  - Determine a look ahead scale factor **(page 10, second full paragraph, taught as setting a preview time),**
  - Determine a steering wheel angle input to the computer model by comparing the look ahead point and the intended path **(page 10, second full paragraph, taught as "using the perceived path error to steer the 'correct' way"),**
  - Operate the computer model with the steering wheel angle input **(page 5 last paragraph-page 6 first paragraph, taught as using the system with the steering wheel angle input),** and
  - Generate an output in response to the vehicle model and the initial steering wheel input or the first steering wheel input **(page 5 figure 4, taught as the error being based on the steering wheel angle input).**

Although Sharp discloses side slip angles, the reference does not disclose using a threshold value of the rear side slip angle in order to determine when to find the look ahead scale factor. Taylor discloses a system for autonomous highway driving including methods for increasing the look-ahead distance. Taylor teaches a controller programmed to determine a rear

side slip angle of a vehicle computer model **(page 444 equation 2)**. Taylor teaches determining a look-ahead scale factor when the rear side slip angle is greater than a threshold **(page 445 section 3.3.4 paragraph 1, scale factor taught as D(s), exceeded threshold taught as increased steering angle in section 3.3 paragraph 1, which would increase the rear side slip angle)**. Taylor further teaches increasing the look ahead point as a function of the look ahead sale factor **(page 445 section 3.3.4 paragraph 2)**.

It would have been obvious to one of ordinary skill in the art of simulation of vehicle operation, at the time of the present invention to modify Sharp's steering control system with Taylor's method for determining the look-ahead distance in order to achieve a system that reconfigures the look-ahead distance when a threshold for the rear side-slip angle is exceeded. The motivation for doing so would have been to increase visibility and improve control when the steering (or side slip) angle is increased beyond a certain point **(Taylor page 453 section 9 paragraph 1)**.

As per claim 2, Taylor does not disclose expressly the threshold value being 15 degrees. However, this is an obvious design choice, as Sharp performs simulated path following, and uses a "sudden 15 degrees change of direction" **(page 11, second to last paragraph)**. This choice for a threshold for a rear side slip angle would have been obvious, because as shown in the prior art, a 15 degree change in direction is a significant one.

As per claim 3, Taylor discloses the controller being programmed to determine a longitudinal vehicle velocity and a lateral vehicle velocity and determining the rear vehicle side

slip angle as a function of the longitudinal vehicle velocity and the lateral vehicle velocity **(page 444 equation 2)**.

As per claims 4, 5 and 6, Taylor discloses the controller being programmed to determine a look ahead factor as a function of an exponential of a product of the rear side slip and a constant **(page 445 section 3.3.4 paragraph 1, taught in the equation for D(s))**.

As per claim 7, Taylor does not disclose expressly the constant being exactly .02. However, Taylor does disclose the constant being .057 **(page 445 section 3.3.4 paragraph 1)**. In the case of aggressive driving, however, .02 would have been an obvious choice, as it would be desirable to have a lower processing delay.

As per claim 8, Taylor discloses determining an unscaled look ahead factor when the rear side slip angle is not greater than the threshold **(page 445 section 3.3.1 paragraph 1)**.

As per claim 9, Sharp discloses the controller being programmed to determine a steering wheel angle input when the vehicle is not on target **(page 10, second full paragraph, taught as "using the perceived path error to steer the 'correct' way")**.

As per claim 10, Sharp discloses a method of operating a vehicle computer model having vehicle **(page 2 section 2)** and path **(page 4 section 3)** information therein comprising:

- Determining a look ahead scale factor **(page 10, second full paragraph, taught as setting a preview time),**
- Determining a steering wheel angle input to the computer model by comparing the look ahead point and the intended path **(page 10, second full paragraph, taught as "using the perceived path error to steer the 'correct' way"),**
- Operating the computer model with the steering wheel angle input (page 5 last paragraph-page 6 first paragraph, taught as using the system with the steering wheel angle input), and

Although Sharp discloses side slip angles, the reference does not disclose using a threshold value of the rear side slip angle in order to determine when to find the look ahead scale factor. Taylor discloses a method of operating a vehicle computer model including increasing the look-ahead distance. Taylor teaches determining a rear side slip angle of a vehicle computer model **(page 444 equation 2)**. Taylor teaches determining a look-ahead scale factor when the rear side slip angle is greater than a threshold **(page 445 section 3.3.4 paragraph 1, scale factor taught as D(s), exceeded threshold taught as increased steering angle in section 3.3 paragraph 1, which would increase the rear side slip angle)**. Taylor further teaches increasing the look ahead point as a function of the look ahead sale factor **(page 445 section 3.3.4 paragraph 2)**.

It would have been obvious to one of ordinary skill in the art of simulation of vehicle operation, at the time of the present invention to modify Sharp's steering control method with Taylor's method for determining the look-ahead distance in order to achieve a method that reconfigures the look-ahead distance when a threshold for the rear side-slip angle is exceeded.

The motivation for doing so would have been to increase visibility and improve control when the steering (or side slip) angle is increased beyond a certain point **(Taylor page 453 section 9 paragraph 1)**.

As per claim 11, Taylor does not disclose expressly the threshold value being 15 degrees. However, this is an obvious design choice, as Sharp performs simulated path following, and uses a "sudden 15 degrees change of direction" **(page 11, second to last paragraph)**. This choice for a threshold for a rear side slip angle would have been obvious, because as shown in the prior art, a 15 degree change in direction is a significant one.

As per claim 12, Taylor discloses determining a longitudinal vehicle velocity and a lateral vehicle velocity and determining the rear vehicle side slip angle as a function of the longitudinal vehicle velocity and the lateral vehicle velocity **(page 444 equation 2)**.

As per claims 13, 14 and 15, Taylor discloses determining a look ahead factor as a function of an exponential of a product of the rear side slip and a constant (**page 445 section 3.3.4 paragraph 1, taught in the equation for D(s)**).

As per claim 16, Taylor does not disclose expressly the constant being exactly .02. However, Taylor does disclose the constant being .057 **(page 445 section 3.3.4 paragraph 1)**. In the case of aggressive driving, however, .02 would have been an obvious choice, as it would be desirable to have a lower processing delay.

As per claim 17, Taylor discloses determining an unscaled look ahead factor when the rear side slip angle is not greater than the threshold **(page 445 section 3.3.1 paragraph 1)**.

As per claim 18, Sharp discloses determining a steering wheel angle input when the vehicle is not on target **(page 10, second full paragraph, taught as "using the perceived path error to steer the 'correct' way")**.

As per claim 19, Sharp discloses a method of operating a vehicle computer model having vehicle information **(page 2 section 2)** and path information **(page 4 section 3)** therein comprising:

- Determining a look ahead point **(page 10, second full paragraph)**;
- Determining a look ahead scale factor **(page 10, second full paragraph, taught as setting a preview time based on the curvature of the path)**;
- When the vehicle is off target, determining a steering wheel angle input to the computer model as a function of an error between the look ahead point and the intended path **(page 10, second full paragraph, taught as "using the perceived path error to steer the 'correct' way")**; and
- Operating the computer model with the steering wheel angle input **(page 5 last paragraph-page 6 first paragraph, taught as using the system with the steering wheel angle input)**.

Although Sharp discloses side slip angles, the reference does not disclose using a threshold value of the rear side slip angle in order to determine when to find the look ahead scale factor. Taylor discloses a method of operating a vehicle computer model including increasing the look-ahead distance. Taylor teaches determining a rear side slip angle of a vehicle computer model **(page 444 equation 2)**. Taylor teaches determining a look-ahead scale factor when the rear side slip angle is greater than a threshold **(page 445 section 3.3.4 paragraph 1, scale factor taught as D(s), exceeded threshold taught as increased steering angle in section 3.3 paragraph 1, which would increase the rear side slip angle)**. Taylor further teaches increasing the look ahead point as a function of the look ahead sale factor **(page 445 section 3.3.4 paragraph 2)**.

It would have been obvious to one of ordinary skill in the art of simulation of vehicle operation, at the time of the present invention to modify Sharp's steering control method with Taylor's method for determining the look-ahead distance in order to achieve a method that reconfigures the look-ahead distance when a threshold for the rear side-slip angle is exceeded. The motivation for doing so would have been to increase visibility and improve control when the steering (or side slip) angle is increased beyond a certain point **(Taylor page 453 section 9 paragraph 1)**.

As per claim 20, Taylor discloses determining a look ahead factor as a function of an exponential of the rear side slip angle **(page 445 section 3.3.4 paragraph 1, taught in the equation for D(s))**.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

"Automated Steering Control System Design for Passenger Vehicle in Consideration of Steering Actuator Dynamics," by Fujiwara et al., published in the Proceedings of the American Control Conference in May 2002, discusses modeling of automated steering.

"Fault Tolerant Force Feedback Actuator for Steer-By-Wire," by Krautstrunk et al., published in Mechatronics 2000 discusses a control system of a steer-by-wire steering system.

"Development of an Automated Steering Vehicle Based on Roadway Magnets – A Case Study of Mechatronic System Design," by Tan et al., published in the IEEE/ASME Transactions on Mechatronics in September 1999, discusses automated highways and control systems implemented into vehicles for automated steering systems.

"Cooperative Steering System Based on Vehicle Sideslip Angle Estimation from Side Acceleration Data at Percussion Centers," by Hiraoka et al., published in the IEEE Vehicle Electronics Conference in 2001, discusses monitoring path following capability based on a combination of manual steering with automatic steering.

"A Framework for Modeling Human-like Driving Behaviors for Autonomous Vehicles in Driving Simulators, by Al-Shihabi et al., published by ACM in 2001, discusses simulation of human-like driving behaviors for the design of autonomous vehicles.

"Robust Control with Decoupling Performance for Steering and Traction of 4WS Vehicles Under Velocity-Varying Motion," by Yingmin Jia, published by IEEE in 2000, discusses modeling of side forces of a vehicle in motion based on acceleration and braking.

"Vision-Based Lateral Control of Vehicles," by Kosecka et al., published for the University of California at Berkeley in 2001, discloses an automated steering system using computer vision for look ahead.

US Patent No. 6,789,017, issued to Aanen et al. on 9/7/2004, discloses a system for calculating a steering angle position based on signals received from relative positions.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimberly Thornewell whose telephone number is (571)272-6543. The examiner can normally be reached on 8am-4:30pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on (571)272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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